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ABSTRACT

Examined in a longitudinal study of children were correspondences and correlations between early language development on the one hand, and the manipulation of objects and play development on the other. There were developmental correspondences between the onset of five language landmarks (the emergence of first word, referential word, demonstrative pronoun, word-chains and two-word utterances) and the onset of subcategories of manipulation of objects and play. These correspondences were compared with the predictions proposed by McCune-Nicolich (1981, 1986) concerning the development of language and symbolic play. Language and the manipulation of objects and play were found to reflect the development of underlying symbolic ability, and develop in parallel at the single-word stage. After the emergence of word-chains, they develop interdependently. (Author/PCB)

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# Symbolic Play and Early Language Development in Normal Children

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Abstract: Correspondences and correlations between early language development and the manipulation of objects and play development were examined through a longitudinal study of four children. There were developmental correspondences between the onset of five language landmarks ( the emergence of first word, referetial word, demonstrative pronoun, word-chains and two-word utterances) and the onset of subcategories of manipulation of objects and play over four children. These temporal correspondences were discussed upon comparison with the predictions which McCune-Nicolich( 1981,1986 ) proposed. Significant postive correlations were found between number of different words and the percentage of occurrence of pretend self-play, pretend other-play and the total of symbolic play. Language, and the manipulation of objects and play both reflect the development of underlying symbolic ability, and develop in parallel at the single-word stage. After the emergence of word-chains, they develop interdependently.

## Introduction

Language develops in connection with other functions. The relationship between cognitive and early language development has been studied by the method of correspondences of the two developmental processes or correlations between two since the early 1970s. The results of these studies were not consistent because language measure, cognitive measure and the period of observation varied in each study. Most researchers used the Uzgiris and Hunt Ordinal Scales

of Psychological Development (1975) which operationally measure sensorimotor behaviors reported by Piaget.

Bloom, Lifter & Broughton (1985) criticized this method. First, some of Piaget's core observations were spontaneous behavior, the generation of which could not be guaranteed by paticular presentations of tasks in a test situation. Second, the Uzgiris and Hunt scales emphasize whether an item is passed, rather than how tasks are solved. Third, according to Piaget, cognitive development is not additive, and is not reducible to quantifiable change in separate and independent dimensions of thought.

Bloom et al. proposed to study children's sensorimotor development naturally occuring in play behavior, and make developmental comparisons with naturally occuring language behavior. Play is spontaneous behavior and so reflects true cognitive capacity as opposed to test situations. Many researchers have studied infant play since the early 1970s (Belsky & Most, 1981; Fenson, Kagan, Kearsley & Zelazo, 1976; Inhelder, Lezine, Sinclair & Stambak, 1972; Rosenblatt, 1977; Zelazo & Kearsley, 1980). The purpose of these studies has been to record the way children respond to objects during the first and second year of life. Implicit in most studies, and explicit in some, is the notion that play with objects reflects cognitive development during infancy.

The present paper reports on the relationship between early language development, and manipulation of objects and play. It assumes that the latter reflects the development of symbolic function, which is one important aspect of cognitive development.

McCune-Nicolich (1977) has demonstrated an ordinal sequence

of five levels in symbolic play following the course originally described by Piaget (1962). McCune-Nicolich (1981) predicted that if language and symbolic play both reflect the development of underlying symbolic ability, then these processes could be expected to develop in parallel, with transitions to more advanced levels occuring close in time. McCune-Nicolich & Bruskin (1982) presented evidence for combinatorial competency in symbolic play and language, but she did not present evidence of the single-word stage in her observed sample.

A number of studies support strong correlations between symbolic play and language during the early stage of language acquisition by both normal and abnormal children (Bates, Benigni, Bretherton, Camaioni & Volterra, 1979; Casby & Ruder, 1983; Lowe & Costello, 1976; Sigman & Ungerer, 1984). While correlational analysis evaluates the extent to which general measures of development in two domains correspond, it does not clarify the content of the relationship.

Correspondence studies through a longitudinal method reveal temporal and structural relationships between language and play. The purposes of the present study were (1) to investigate correspondences and correlations between early language development and the manipulation of objects and play development through a longitudinal study of four children, (2) to test the theoretical hypothesis which McCune-Nicolich proposed (1981).

Language measures were number of different words which reflect the index of language development, and five landmarks——the emergence of first word, referential word, demonstrative pronoun, word-chains of interjection and independant words and word-chains of two independent words (two-word utterances).

The measures of the manipulation of objects and play were our developmental categories. We rated on the basis of how children responded to materials, how children related two or more objects, whether children pretended at self-related activities or extended symbolism beyond their own actions, and whether children produced single pretend gestures or combinatorial pretend gestures. The categorization of present study is based on Belsky & Most (1981) and Fenson et. al. (1976), and included earlier manipulations than pre-symbolic scheme which McCune-Nicolich coded (1977).

## Method

### Subjects

The subjects were 4 Japanese normal children (3 males, T.O., K.M., E.A., 1 female M.O.) from middle-class families of Matsue City (TABLE 1). M.O. and T.O. were brother and sister. The parents of four children worked and so M.O., T.O., and K.M. were cared by middle aged women and E.A. was cared for by his grandmother and his great-grandmother in the daytime.

### Procedures

M.O., T.O. and K.M. were observed every three weeks from the age of 7 months to the onset of two-word utterances and E.A. was observed from the age of 12 months to the emergence of two-word utterances (TABLE 1). M.O., T.O. and E.A. were observed for two hours at their homes, and K.M. was observed at caregiver's house where K.M. spent daytime. The children

played freely with caregiver or author and were tested with cognitive tasks by the author. All of the children's behaviors during observation time were recorded on videotape.

The session of the manipulation of objects and play with a set of toys and materials was at least 15 minutes in duration. Toys and materials were as follows:

Meal utensils (two cups, a plate, two spoons, a fork, miniature fruits, two miniature cups, a bottle, a miniature bottle).

Dressing items (a mirror, a comb, a hairbrush,a toothbrush, miniature toilet goods, a miniature hair brush).

Bathing utensils (a washbowl, a soap case, a sponge, a washcloth).

The play objects were six blocks of $6cm^3$ with animal paintings, ten red blocks of $2cm^3$, a truck with string, a toy trumpet, a small ball and a large ball, a doll and doll's dresses, a stuffed panda, animal toys made of rubber, and two rattles.

Data analysis

Language production

The number of different words were counted for 90 minutes in each session and the kinds of words and their meanings were noted down through reproduction of videotapes. Five language landmarks were clarified through consultations of videotapes and their families' and caregiver's reports about language development. These were:

(a) The time of emergence of first word

(b) The time of emergence of referential word

(c) The time of emergence of demonstrative pronoun (this, here, that)

(d) The time of emergence of word-chains (combinations of independent word and function word, combinations of interjection and independent word)

(e) The time of emergence of two-word utterances (combinations of two independent words)

Manipulation of objects and play

Children's spontaneous behavior during play situation with a set of toys and materials during 15 minute periods were classified according to the categories presented TABLE 2. The frequency of each category at each session was computed. The percentage of occurence of each category was calculated dividing frequency of each category by total of frequency of each category.

Combinatorial symbolic play was divided into acts and each act was classified by category.

Reliability of categorization

The same rater categorized 15 minute play situations at five language landmarks twice in an interval of ten months. There was 90.7% agreement for M.O., 90.3% agreement for T.O., 88.5% agreement for K.M. and 87.0% agreement for E.A.

## Results

Correspondences

There were developmental correspondences between the onset of five language landmarks and the onset of subcategories of

manipulation objects and play (FIG.1).

(1) Emergence of first word

M.O. uttered yoicho, picking up a picture book at 10;20 (ten months twenty days), T.O. uttered ai when his name was called at 10;11 and M.K. uttered manma requesting food at 9;08. E.A. uttered no word at his first observation, 11;17 but his grandmother reported he had said anan(dog), manma (food), bubu(car) and na(cat), and so his first word had already emerged prior to 11;17. First word did not represent a particular object or event, but referred to food in general or was uttered accompanying an action.

As to the onset of the subcategories of the manipulation of objects and play at this time, M.O. manipulated two materials without any relation or meaning (inappropriate relational manipulation), and placed blocks in a container (container relational manipulation) at 10;20. T.O. began container relational manipulation and functional relational manipulation at 10;11. K.M. began functional relational manipulation at 9;08. E.A. had already performed all subcategories of relational manipulation by his first observation, 11;17.

The emergence of the first word corresponded to the onset of functional-relational manipulation and container-relational manipulation.

(2) Emergence of referential word

At 11;27 M.O. uttered manma, ma seeing the baby-bottle and her caregiver reported three referential words, baba(caregiver), chachan(her mother), and wanwan(dog). At 12;02 T.O. uttered tote when he wanted the caregiver to wind a toy and

gave her it, and his caregiver reported referential word, nyannyan(cat), chunchun(bird), bubu(car) and wanwan(dog) etc.. At 11;16 K.M. uttered awachan to call to his caregiver. At 12;09 E.A. pointed to a toy dog and uttered wanwan.

As to the onset of the subcategory of the manipulation of objects and play at this time, M.O. began enactive naming acts (she blew a toy trumpet), pretend self-play (she touched spoon to her mouth and pretended to eat) and grouping relational manipulation (she tried to stack two blocks but could not stack) at 11;27. At 10;11 and 11;09, T.O. touched a cup to his mouth once and this act was counted as an enactive naming, but, as this act was connected to food, it is also close to sensory effect's manipulation. T.O. began real enactive naming acts (he stirred spoon in a cup, touched hairbrush to his hair without making combing motion etc.) at 12;02. At 11;16 for K.M. and 12;09 for E.A., enactive naming acts emerged.

Considering the onset of subcategory of manipulation of objects and play from the results of four children, the emergence of referential word use corresponded to the onset of enactive naming acts.

(3) Emergence of demonstrative pronoun

Emergence of demonstrative pronoun coincided with the time of vocabulary spurt when number of different words were over 10 words (15;20 for M.O., 15;00 for T.O., 13;26 for K.M. and 18;18 for E.A.). At the same time M.O., T.O. and K.M. acquired ata that means finding an object or succeeding in an act.

As to the onset of the subcategory of the manipulation of objects and play at the emergence of demonstrative pronoun,

M.O. began combinatorial symbolic play with multischeme combinations (she poured something from the small toilet bottle into a cup, stirred the spoon in the cup, raised the spoon to her lip and pretended to eat) at 15;20. T.O. began combinatorial symbolic play with combinations of single scheme (he pretended to eat a toy banana and then fed a toy banana to a rubber rabbit) at 15;00. At 15;06 T.O. substituted blocks for food and pretended to eat blocks or placed his hand to his ear pretending to telephone when adult said "moshi moshi(hello!)". At 13;26 K.M. began substitution play (substitution of blocks for food) and combinatorial symbolic play with combinations of schemes on a theme of dressing. At 18;18 E.A. began to substitute blocks for food and pretended to eat them.

Pretend doll-play emerged at 16;18 for M.O., at 15;00 for K.M. and at 16;13 for E.A.. Pretend doll-play, substitution play and combinatorial symbolic play co-occured within three weeks for M.O., T.O. and K.M.. Though E.A. began pretend doll play at 16;13, he did not acquire demonstrative pronoun and a vocaburary of 10 different words at this time. From this result, it appears substitution play co-occured at the onset of demonstrative pronoun and vocabulary spurt.

(4) Emergence of word-chains

Combinations of interjection and independent word emerged at 16;18 for M.O., at 15;23 for T.O., at 14;17 for K.M. and at 18;18 for E.A..

Combinatorial symbolic play occured at 15;20 for M.O., at 15;00 for T.O., and at 13;26 for K.M. as described at the section of emergence of demonstrative pronoun. E.A. engaged combinatorial symbolic play with single scheme on theme of

dressing at 17;24.

Combinatorial symbolic play emerged about three weeks before the emergence of combinations of interjection and independent word (FIG. 1).

(5) Emergence of two-word utterances

Two-word utterances were produced at 20;03 for M.O. (wanwan mada), at 19;27 for T.O. (zochan nocheta, zochan nai), at 16;18 for K.M. (achi iko) and at 22;00 for E.A. (bubu baibai). M.O. uttered word-chains of wanwan and jargon at 19;11.

As to the manipulation of objects and play, combinatorial symbolic plays on two themes were observed. M.O. engaged combinatorial symbolic play on two combined themes of bathing and dressing at 20;03 (she rubbed the body of a stuffed panda with sponge, rubbed her hands with sponge, dried the body of a stuffed panda with a towel, combed stuffed panda's hair, and then combed her hair). Combinatorial symbolic play on two themes occured at 20;18 for T.O. (one sequence was two combined themes of meal and dressing, the other, that of combing and toilet care), at 17;22 for K.M. (two combined themes of trying to please a baby doll and dressing herself), and at 22;26 for E.A. (two combined themes of eating and washing). Part of these sequences involved several actions in appropriate order.

From the results of studying four children, it appears that two-word utterances emerged about three weeks before the emergence of combinatorial symbolic play with two combined themes.

## Percentage of occurence of each category

FIG. 2 displays means of four children for percentage of occurence of each category, number of different words and age in months at five language landmarks. The tendency of each child is similar to FIG. 2. Study of percentage of occurence of simple manipulation, sensory effect's manipulation and inappropriate relational manipulation shows a large decrease by the onset of demonstrative pronoun. However, percentages of occurence of enactive naming and symbolic play show a marked increase at the onset of demonstrative pronouns. Percentage of occurence of appropriate relational manipulation increases gradually from the emergence of first word to the emergence of demonstrative pronoun, but afterwards the tendency differs with each child.

## Correlations

Though it is questionable to compute correlation coefficients using scores of same children observed longitudinally, Spearman's rank correlation coefficients of each child between number of different words, and the percentage of occurence of manipulation of objects and play are computed for each child, and shown in TABLE 3. Significant positive correlations were found between number of different words and the percentage of occurence of pretend self-play, pretend other-play and the total of symbolic play for all children. Significant negative correlation was found between that of simple manipulation and number of different words for all children.

## Discussion

There were temporal correspondences between early language production and manipulation of objects and play over four children. Individual differences were found for the onset time. K.M.'s language and play development were fast and those of E.A. was slow. Developmental pattern of M.O. and T.O. was similar. E.A. was cared for by his grandmother and his great-grandmother and his needs were satisfied before he uttered vocalizations of his requests. In the play situation, great-grandmother rarely spoke to him and there were few mutual interactions. Factors of individual differences need to be investigated further.

Next the predictions of McCune-Nicolich concerning play and language correspondences are examined and made comparisons with these results. Her hypothesized relationships are presented in TABLE 4 (McCune-Nicolich, 1986).

In the present study presymbolic scheme corresponds to enactive naming acts. The emergence of enactive naming acts corresponds to the onset of referential words. In level 1 of Nicolich, the meaning expressed in both play and language are fused with action, and in language, analogous symbolic vocal and gestural behaviors, which precede referential words, are identified. The discrepancy with McCune-Nicolich may be due to difference of language measure which is onset time in present study and may be predominant period in McCune-Nicolich.

Autosymbolic scheme of level 2 corresponds to pretend self-play in the present study. Both pretend behavior and

referential words indicate the beginning of a separation between the means of siginifying a meaning and the meaning itself. In this study, referential word emerged before pretend self-play.

In decentered play of level 3, the child recognizes the general meanings of various actions and their separation from the self by applying his or her own schemes to a doll. The world is cognized in more differentiated terms because actions are recognized as separate from partcipants in actions. Two qualitaive changes in single-word language can be expected as a result of this differentiation. First, word would begin to be used which refer more specifically to the dynamic aspect and second, vocabulary words should be learned which refer to more differentiated aspects of the environment. At the emergence of pretend doll-play, the four children in the present study did not acquire vocabulary words which referred to more differentiated aspects of the environment.

At level 4 both language and symbolic play proceed from single units to combinations. At their onset, combinations in both domains are proposed as linear and context-dependent. In play the children recreate sequences of behavior previously observed, or string together actions involving a given object and several available `actors'. In language, combinations are formed either on the basis of linguistic context or the children simply mention several aspects of the nonlinguistic context in sequence. In the present study the co-occurence of such initial combinatorial language and play combinations was not found, but combinatorial symbolic play with one theme preceded early word combinations

(Combinations of interjection and independent word) by about three weeks. Combinatorial symbolic play with two themes emerged about three weeks after the onset of two-word utterances.

Later combinations, characteristic of level 5 play, are proposed as hierarchical, in the sense that a prior mental act guides the construction of a sequence of actions. In language, children produce a rule-based utterance which assumes a hierarchical structure because an internal "plan" relates the symbolic elements to one another. The present study did not investigate this level.

To summarize, present results did not support the content of each level which McCune-Nicolich proposed, but supported her basic hypothesis for predicting correspondences between symbolic play and early language. The present study suggested language, and the manipulation of objects and play both reflect the development of underlying symbolic ability, and develop in parallel at the single-word stage. After the emergence of word-chains, they appear to develop interdependently. After the emergence of word-chains, the hypothesis of Bloom et al. (1985)——the developmental relation between early cognition and language is most probably neither parallel nor but, rather, interdependent or overlapping as children's cognition and language mutually inform and transform one another in the course of development from 1 to 3 years of age ——may be supported. McCune-Nicolich considers correspondences based on the scale of play development, but the present study considers it based on language development. The research of McCune-Nicolich is on a theoretical model while the present study is based on

observation of four children's longitudinal development. Some discrepancies may originate in the difference of methodology.

Correlational analysis in the present study showed a postive relation between pretend self-play, pretend other-play and the total of symbolic play, and number of different words. This result is consistent with the researches of Bates et al. (1979) and Lowe & Costello (1976). Casby & Ruder (1983) reported symbolic play which involves the use of one object to represent another (substitution play) was found to be a strong correlate of early language development. Correspondence analysis showed the co-occurence of substitution play, and vocabulary spurt, the emergence of demonstrative pronoun and the acquisition of "ata" that encodes finding and success meanings. Children constructed the relationship between a "signifier" and a "signified" in language and play at the stage of the emergence of demonstrative pronoun. After this stage, vocabulary size increased rapidly. According to Morehead & Morehead (1974), true representation begins with symbolic play, and representation, as in symbolic play, is seen as an essential ingredient for the development of language. Here, symbolic play implies the representation of an absent object and/or make-believe representation: the child substitutes object or events (signifiers) for other objects or events (the signified).

It took about 5-7 months to acquire over 10 different words after the emergence of a first word in the present study. This result suggests it was milestones of normal language development for children to acquire 10 different words.

Finally what abilities do symbolic function develop?

Sigman & Ungerer (1984) reported that there were no differences in sensorimotor skills between autistic, mentally retarded, and normal groups matched with respect to mental age (MA is 24.6-26.6 months of age), but autistic children seemed to be a distinct group with specific deficits in imitation and symbolic abilities. They hypothesized that representational thought may be manifested in two different systems. One system, reflected in the development of sensorimotor skills, may invlove the capacity to recall information that then is accessible for problem solving. The capacity to translate experience into language and play symbols that are manipulated independently may reflect a second system. It is in the second system, the ability to form and manipulate symbols that autistic children may have a major impairment. The cognitive deficits seen in autistic children are secondary to their impaired social development. All the areas of specific cognitive deficit identified depend on social interaction for their development. Symbolic and social development in young children are necessarily intertwined. Werner & Kaplan (1963) emphasized the essential social basis of symbolization in addressor-addressee relationship.

Further research on language-delayed children will contribute to clarifying factors of symbol formation.

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TABLE 1 Subjects and the period of observation

| Subjects | | Sex | Period of observation | Number of observations |
|---|---|---|---|---|
| M.O. | Second born | Female | 7;4 [a] - 20;23 | 18 |
| T.O. | Third born | Male | 7;1 - 17;22 | 18 |
| K.M. | First born | Male | 7;28 - 17;22 | 15 |
| E.A. | Second born | Male | 11;17 - 22;26 | 16 |

a) Seven months and four days.

TABLE 2 Category of manipulation of objects and play

| Category | | | Abbreviation | Definition | Example |
|---|---|---|---|---|---|
| Simple manipulation | | | SM | Indiscriminate mouthing of materials<br>Indiscriminate banging and shaking | mouths toys<br>bangs toys |
| Senseory effect's manipulation | | | SEM | Manipulation of materials with sensorimotor schemes already acquired for sensory effect | squeezes sound toys<br>shakes rattles |
| Relational manipulation | Inappropriate relational manipulation | | IRM | Manipulation of two or more materials without any relation and the meaning of which is difficult to interpret | hits a cup with a rattle |
| Relational manipulation | Appropriate relational manipulation | Container relational manipulation | CRM | Placing unrelated objects in another object<br>Placing unrelated object on another object | puts blocks in a container<br>places a cup on a block |
| Relational manipulation | Appropriate relational manipulation | Grouping manipulation | GM (ARM) | Combining two or more, similar or same objects | combines two cups<br>builds towers with two or more blocks |
| Relational manipulation | Appropriate relational manipulation | Functional relational manipulation | FRM | Bringing together and integrating two objects in an appropriate manner | sets a cup on a saucer<br>places a lid on a bottle |
| Enactive naming act | | | ENA | Manipulation of materials according to their appropriate and conventional usage | brushes hair<br>eats with a spoon |
| Combinatorial symbolic play | Pretend self-play | | PSP | Pretense behavior directed toward self | pretends to drink<br>pretends to wash |
| Combinatorial symbolic play | Pretend other-play | | (To other person)POP<br>(To doll)PDP | Pretense behavior directed toward other person<br>Pretense behavior directed toward doll | feeds mother with a spoon<br>feeds doll with a spoon |
| Combinatorial symbolic play | Substitution play | | SP | Using materials as a substitute for other objects | substitutes blocks for a train |
| Combinatorial symbolic play | Symbolic play | Combinations of single scheme | CSP | Repetition of a single pretense act to a series of agents or patients | drinks from a bottle and then brings it to doll's mouth as if to feed them |
| Combinatorial symbolic play | Symbolic play | Multischeme combinations | CSP | Linking together different pretense schemes | stirs in a cup with a spoon and then drinks from the cup |
| Combinatorial symbolic play | Symbolic play | Combinations of single scheme and multischeme | CSP | Repetition of multischeme combinations to a series of agents or patients | stirs in a cup with a spoon, then drinks from the cup and brings it to doll's mouth as if to feed them |

TABLE 3 Spearman's rank correlation coefficients between number of different words, and the percentage of occurence of manipulation of objects and play

| Subjects | Number of samples | Simple manipulation | Senseory effect's manipulation | Relational manipulation | | Enactive naming act | Symbolic Play | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Inappropriate relational manipulation | Appropriate relational manipulation | | Pretend self-play | Pretend other-play | Substitution play | Total of symbolic play |
| M.O. | 18 | -0.857*** | -0.525* | -0.100 | 0.284 | 0.579** | 0.792*** | 0.818*** | 0.141 | 0.906*** |
| K.O. | 18 | -0.807*** | -0.303 | -0.060 | 0.542** | 0.554** | 0.908*** | 0.838*** | 0.594** | 0.928*** |
| K.M. | 12 | -0.861*** | -0.027 | -0.503* | 0.844*** | 0.857*** | 0.883*** | 0.883*** | 0.114 | 0.899*** |
| E.A. | 14 | -0.856*** | -0.760*** | 0.003 | 0.241 | 0.038 | 0.680** | 0.878*** | 0.802*** | 0.890*** |

* p<.05, ** p<.01, *** p<.001

TABLE 4 Sequences of Symbolic Development as Expressed in Play and Language

| Underlying Development | Play | Language |
|---|---|---|
| Level 1. Association of event with habitual action | Recognition of objects<br>[Presymbolic Schemes][a] | Prelanguage communication |
| Level 2. Representation of global event as a unit | Self-pretend<br>[Autosymbolic Schemes] | Single words, global reference |
| Level 3. Analysis of represented object/event | Differentiated pretend<br>[Decentered Symbolic Games]<br>Pretend with dolls<br>Pretend at others' activities | Reference to broader range<br>Of entities, to parts<br>Of entities, to states |
| Level 4. Juxtaposition of symbolic elements | Pretend combinations<br>[Combinatorial Symbolic Games] | Simple language combinations |
| Level 5. Construction of relations among symbolic elements<br>Storage of complete event while component parts are organized | Planning<br>[Internally Directed Symbolic games]<br>Storage of symbolic goal while intervening steps are accomplished<br>Keeping dual meaning of substitute object(e.g.,block =doll) while performing doll-appropriate activities | Development of language rules<br>Storage of complete message while component parts are organized |

From: McCune-Nicolich (1986).
a [ ] was added from McCune-Nicolich (1981) by the author.

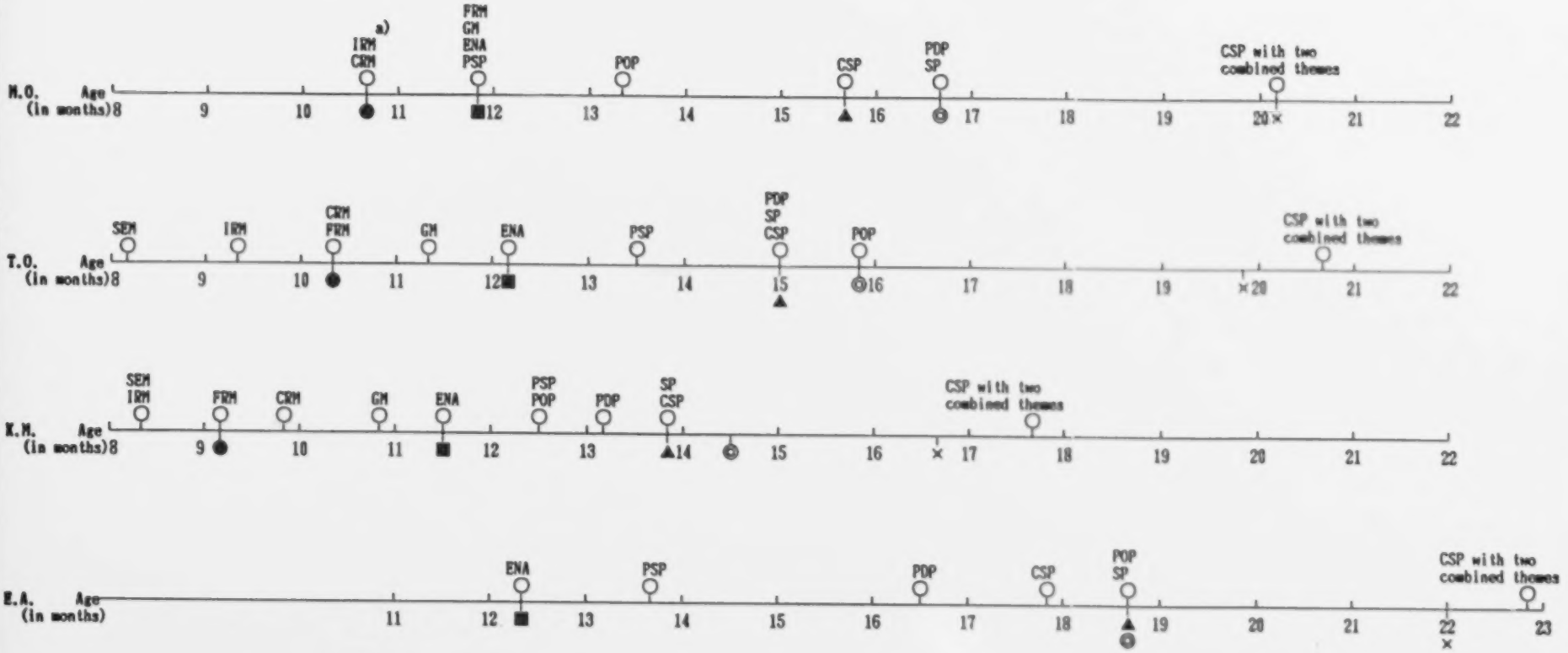


FIG. 1 Time of emergence of manipulation of objects and play, and the landmarks of early language development

● = Emergence of first word
■ = Emergence of referential word
▲ = Emergence of demonstrative pronoun, vocabulary spurt
◎ = Emergence of word-chains
× = Emergence of two-word utterances

a) See TABLE 2 about the abbreviation of category of manipulation of objects and play

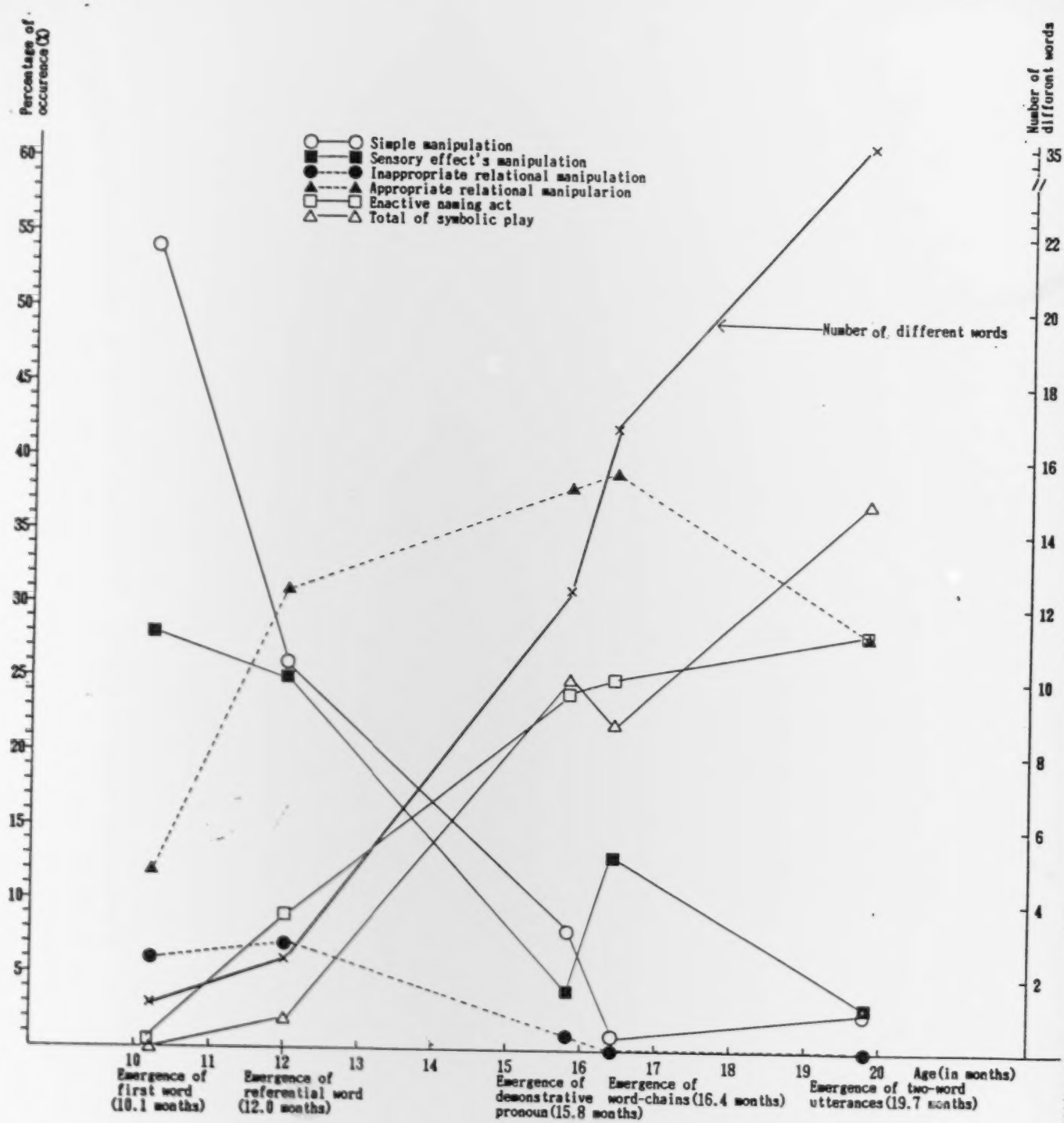
Percentage of occurence(%)
Number of different words
Simple manipulation
Sensory effect's manipulation
Inappropriate relational manipulation
Appropriate relational manipulation
Enactive naming act
Total of symbolic play
Number of different words
Age(in months)
Emergence of first word (10.1 months)
Emergence of referential word (12.0 months)
Emergence of demonstrative pronoun (15.8 months)
Emergence of word-chains (16.4 months)
Emergence of two-word utterances (19.7 months)

FIG. 2 Mean of number of different words, and the percentage of occurence of manipulation of objects and play at the landmarks of early language development